

CE 603- PSAD [Engr. Calaque, Dario Jr. A]

1st QUIZ

INSTRUCTIONS:

- CHEATING IS PROHIBITED! Mind your own paper. Any act of cheating (using of cellular phones, books, and lecture materials during examination, copying answers from your seatmate, etc.) will result to failure of examination.
- No borrowing of calculator.

01) When one boy is sitting 1.20m from the center of a seesaw, another boy must sit on the other side 1.50m from the center to maintain an even balance. However, when the first boy carries an additional weight of 14kgs and sit 1.80m from the center, the second boy must move to 3m from the center to balance. Neglecting the weight of the see-saw, find the weight of the heaviest boy.

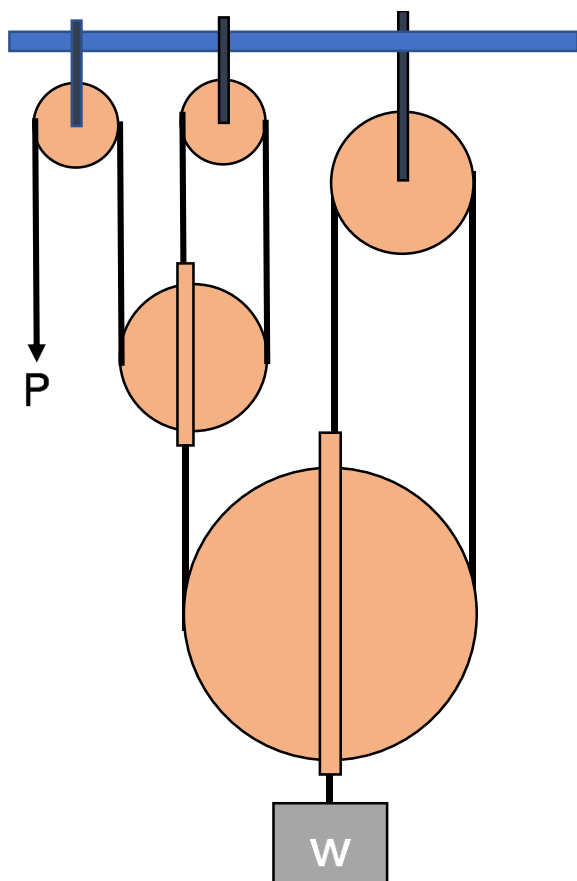
a) 42kgs

b) 34kgs

c) 54kgs

d) 22kgs

02) For the system of pulleys shown in the figure below,



Determine the ratio of W to P to maintain equilibrium. Neglect axle friction and weights of the pulleys.

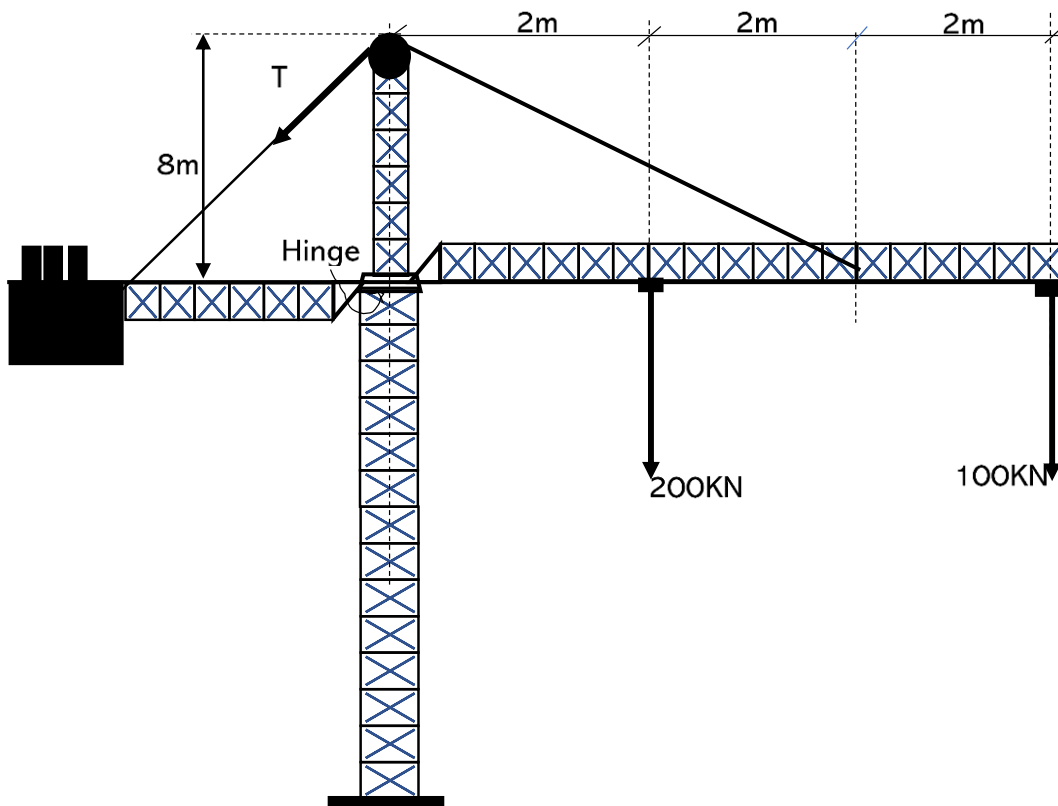
a) 9

b) 6

c) 8

d) 7

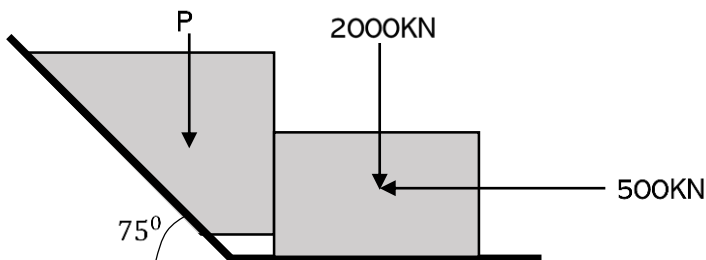
03) A boom AB is supported in a horizontal position by a hinge A and a cable which runs from "C" over a small pulley at D as shown in the figure below.



Compute the tension T in the cable if the cable pulls the boom AB into a position at which it is inclined at 30 degrees above the horizontal. The loads remain vertical. Neglect the size of the pulley at D.

- a) 279kN
- b) 125kN
- c) 216.5kN**
- d) 112.50kN

04) Determine the force P required to start the wedge shown in the figure below. The angle of friction for all surface in contact is 15 degrees.



- a) 525kN
- b) 671kN
- c) 805kN
- d) 941kN**

05) Two men are just able to lift a 300kgs weight with a crowbar when the fulcrum for this lever is 0.3m from the weight and the men exert their strengths at 0.9m and 1.5m, respectively from the fulcrum. If the men interchange positions, they can raise a 340kgs weight. What force does each man exert?

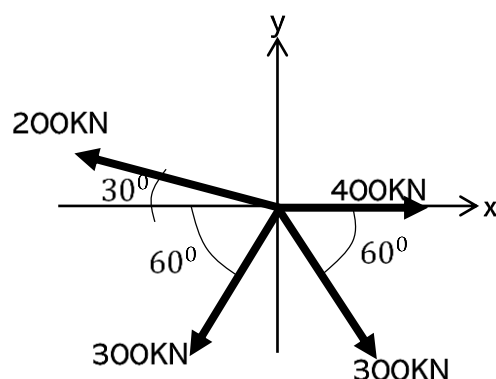
a) 30kgs, 50kgs

b) 40kgs, 50kgs

c) 35kgs, 45kgs

d) 25kgs, 40kgs

06) Find the resultant of the concurrent force system shown in the figure.



a) 477KN

b) 577KN

c) 420KN

d) 230KN

07) Two identical spheres weighing 100KN each are placed in a container such that the lower sphere will be resting on a vertical wall and a horizontal wall and the other sphere will be resting on the lower sphere and a wall making an angle of 60degrees with the horizontal. The line connecting the two center of the spheres makes an angle of 30degrees with the horizontal surface. Determine the reaction between the contact of the two spheres. Assume the walls to be frictionless.

a) 150KN

b) 120KN

c) 100KN

d) 80KN

08) A thin heavy uniform iron rod 16m long is bent at the 10m mark forming a right-angled L – shaped piece 6m by 10m. The bend rod is hung on a peg at the point of bend. What angle does the 10m side make with the vertical when the system is in equilibrium?

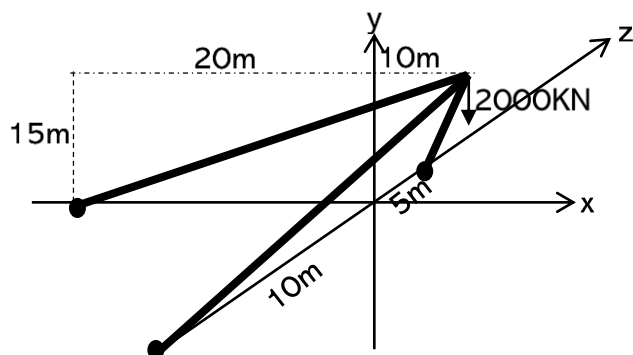
a) 19°48'

b) 28°12'

c) 24°36'

d) 26°14'

09) The shear-leg derrick shown in the figure below supports a vertical load of 2000KN applied at A.



Points B, C and D are in the same horizontal plane and A, C and D are in the XY plane. Determine the force in each member of the derrick.

- a) 1054KN (C), 2803KN (T) and 2533KN (C)
- b) 1221KN (C), 2227KN (T) and 2114KN (C)
- c) 1452KN (C), 2782KN (T) and 2004KN (C)
- d) 1373KN (C), 2233KN (T) and 2493KN (C)**

10) A wire connects the middle of links AC and AB. Compute the tension in the wire if AC carries a uniform load of 600N/m. AC is 4.5m long and BC is 7.5m. Point A is hinged on the wall and joint C is also a hinged connecting the links AC and CB. AC is horizontal while B is supported by a roller acting on the wall AB.

- a) 3700N
- b) 2700N**
- c) 1700N
- d) 4700N

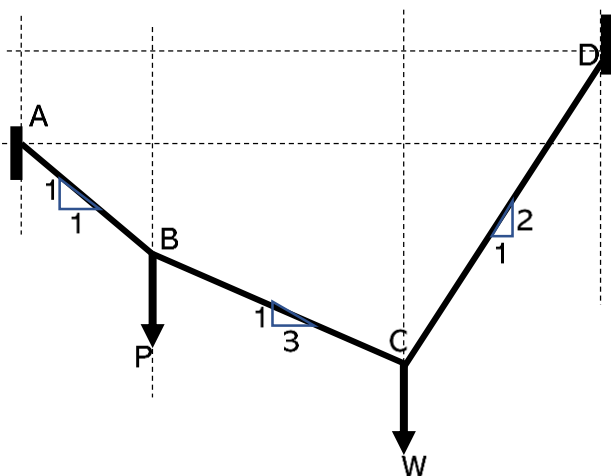
11) Determine the sag of a flexible wire cable weighing 60N/m over two frictionless pulleys 100m apart and carrying one 10KN weight at each end. Assume the weight of the cable to be uniformly distributed horizontally. The cable extends 5m beyond each pulley to the point they are attached to the weights.

- a) 3.21m
- b) 7.61m**
- c) 10.71m
- d) 15.31m

12) A dockworker adjusts a spring line (rope) which keeps a ship from drifting along side a wharf. If he exerts a pull of 200N on the rope, which has $1\frac{1}{4}$ turns around a mooring bit, what force T can he support? The coefficient of friction between the rope and the cast-steel mooring bit is 0.30.

- a) 2110N**
- b) 3110N
- c) 1110N
- d) 4110N

13) A hoisting mechanism uses a cable system as shown below.



If the load $W=3\text{tons}$, compute the effort, P required at point B.

- a) 1345lbs
- b) 1715lbs**
- c) 2065lbs
- d) 2350lbs

14) A 3.6m ladder weighing 180N resting on a horizontal floor at A and on the wall at B making an angle of 30degrees from the vertical wall. When a man weighing 800N reaches a point 2.4m from the lower end (point A), the ladder is just about to slip. Determine the coefficient of friction between the ladder and the floor if the coefficient of friction between the ladder and the wall is 0.20.

- a) 0.35**
- b) 0.42
- c) 0.28
- d) 0.56

15) A ladder is resting on a horizontal plane and a vertical wall. If the coefficient of friction between the ladder, the horizontal plane and the vertical wall is 0.40, determine the angle that the ladder makes with the horizontal at which it is about to slip.

- a) 64.13degrees
- b) 33.6degrees
- c) 53.13degrees
- d) 46.4degrees**

-----Nothing Follows-----